



October 14, 2010

**AMERICAN SCHOLASTIC MATHEMATICS ASSOCIATION
JR/INTER SCHOOL DIVISION
SOLUTIONS, CONTEST #1 2010-2011**

Adviser: Score the contest using the answers below or equivalents. Send the scorecard within 5 days. Make up any missed contests as soon as possible. Include cumulative scores for all students.

ANSWERS

<p>1. Let n = the number $150\% = 1.5$ $1.5 \times n = 300$ $n = 200$ ANSWER: 200</p>	<p>1. 200</p>
<p>2. Since each of the six people will age 4 years, their average age will be $23 + 4 = 27$ years. ANSWER: 27</p>	<p>2. 27</p>
<p>3. Let m = number of hours store is open on Monday. $5m$ [5 weekdays] + $m + 2$ [Saturday] + $m/2$ [Sunday] = 67 $5m + m + 2 + m/2 = 67$ $6m + 2 + m/2 = 67$ $12m + 4 + m = 134$ $13m + 4 = 134$ $13m = 130$ $m = 10$ ANSWER: Store is open 10 hours on Monday</p>	<p>3. Store is open 10 hours on Monday</p>
<p>4. For each dozen pens, Jane makes a profit of \$6.00 - \$3.79 or \$2.21. In order to make a profit of \$100, she must buy and sell at least 46 dozen pens. ($\\$100 \div 2.21$) ANSWER: 46 dozen pens</p>	<p>4. 46 dozen pens</p>
<p>5. $A_{\triangle ACM} = 1/2b \times h = 1/2 \times AM \times \text{height} = 5 \text{ sq. cm.}$ $A_{\triangle ABC} = 1/2b \times h = 1/2 \times AB \times \text{height}$ But the height of both triangles is the same and the length of \overline{AB} is 2 times the length of \overline{AM}. Therefore, Area of $\triangle ABC$ is 2x Area of $\triangle ACM$ or 10 sq. cm. ANSWER: 10 sq. cm</p>	<p>5. 10 sq. cm</p>
<p>6. By trial and error, $1\frac{3}{5}$ and $2\frac{2}{3}$ have the same sum and product. ANSWER: $1\frac{3}{5}$ and $2\frac{2}{3}$</p>	<p>6. $1\frac{3}{5}$ and $2\frac{2}{3}$</p>
<p>7. Couples: AB CD EF GH Handshakes AC BC CE DE EG FG AD BD CF DF EH FH AE BE CG DG AF BF CH DH AG BG AH BH ANSWER: 24 Handshakes</p>	<p>7. 24</p>



November 11, 2010

**AMERICAN SCHOLASTIC MATHEMATICS ASSOCIATION
JR/INTER SCHOOL DIVISION
SOLUTIONS, CONTEST #2**

2010-2011

Adviser: Score the contest using the answers below or equivalents. Send the scorecard within 5 days. Make up any missed contests as soon as possible. Include cumulative scores for all students.

ANSWERS

<p>1. From 1-99, 3 appears on 19 pages; from 100-299, 3 appears on $2 \times 19 = 38$ pages; from 300-399, 3 appears on 100 pages; from 400-500, 3 appears on 19 pages; $19 + 38 + 100 + 19 = 176$</p> <p align="right">ANSWER: 176</p>	<p>1. 176</p>
<p>2. From 2:55 to 3:19 is 24 minutes $24/60 = 2/5$ of an hour. $2/5 \div 24$ hours in a day = $2/5 \times 1/24 = 1/60$ of a day. ANSWER: $2/5$ of an hour, $1/60$ of a day (both required)</p>	<p>2. $2/5$ of an hour, $1/60$ of a day (both required)</p>
<p>3. Each triangular face of the pyramid is an equilateral triangle with side 4 cm. Since angle APB is an angle in an equilateral triangle, it measures 60°. ANSWER: measure of angle APB = 60°</p>	<p>3. measure of angle APB = 60°</p>
<p>4. Let h = hearts, s = spades, c = clubs $h + s = 12$, $h + c = 11$, therefore $s = c + 1$ $s + c = 10$ $(c + 1) + c = 10$ $2c + 1 = 10$ $2c = 9$ $c = 4.5$ $s = 5.5$ $h = 6.5$ $2h = 13$</p> <p align="right">ANSWER: 2 hearts = 13 points</p>	<p>4. 2 hearts = 13 points</p>
<p>5. Let s = sale price, p = original price $s = .8p + .1(.8p)$ $s = .8p + .08p$ $s = .88p$ Discount is actually .12; $(p - .88p)$ or 12% ANSWER: 12%</p>	<p>5. 12%</p>
<p>6. Let m = amount Jeff had at the beginning Working backwards, Jeff had \$1.35 left after lending his sister $3/4$ of what he had left. That is, he lent his sister \$4.05. $m = m/2 + 2.75 + 4.05 + 1.35$ $m = m/2 + 8.15$ $2m = m + 16.30$ $m = \\$16.30$</p> <p align="right">ANSWER: \$16.30</p>	<p>6. \$16.30</p>
<p>7. Since there is a mode, it can be 30, or 40, or 50 or 80. {30, 40, 50, 80, x} The median, however, must be 40, or 50. {30, 40, 50, 80, x} Trying 40, the mean is 48. Trying 50, the mean is 50. therefore, $x = 50$ (mean = 50, median = 50, mode = 50)</p> <p align="right">ANSWER: $x = 50$</p>	<p>7. $x = 50$</p>

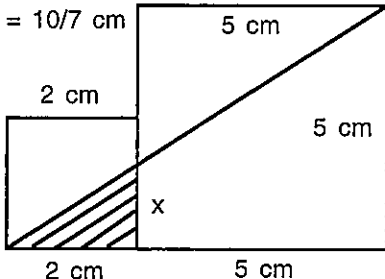
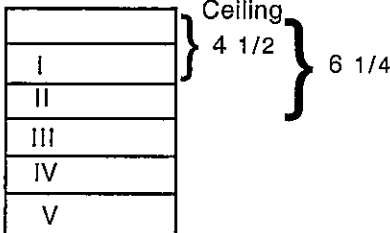


December 9, 2010

**AMERICAN SCHOLASTIC MATHEMATICS ASSOCIATION
JR/INTER SCHOOL DIVISION
SOLUTIONS, CONTEST # 3 2010-2011**

Adviser: Score the contest using the answers below or equivalents. Send the scorecard within 5 days. Make up any missed contests as soon as possible. Include cumulative scores for all students.

ANSWERS

<p>1. Let n = number of coins; $n/4$ = number of nickels; $5n/9$ = number of pennies. $n = 7 + n/4 + 5n/9$ $36n = 252 + 9n + 20n$ $36n = 252 + 29n$ $7n = 252$ $n = 36$ coins. Dimes = 7 = \$0.70. Nickels = 9 = \$0.45. Pennies = 20 = \$0.20 Total = \$1.35 ANSWER: \$1.35</p>	<p>1. \$1.35</p>																
<p>2. In a 12-hour period, digital clocks can display: 1:00 (10 x 10) 4:00 (20 x 20) 9:00 (30 x 30) 1:21 (11 x 11) 4:41 (21 x 21) 10:24 (32 x 32) 1:44 (12 x 12) 5:29 (23 x 23) 11:56 (34 x 34) 2:25 (15 x 15) 6:25 (25 x 25) 12:25 (35 x 35) 2:56 (16 x 16) 7:29 (27 x 27) 3:24 (18 x 18) 8:41 (29 x 29) ANSWER: 16 are perfect squares</p>	<p>2. 16</p>																
<p>3.</p> <table><tr><td></td><td>H</td><td>D</td><td>L</td></tr><tr><td>H</td><td>X</td><td>✓</td><td>X</td></tr><tr><td>D</td><td>X</td><td>X</td><td>✓</td></tr><tr><td>L</td><td>✓</td><td>X</td><td>X</td></tr></table> <p>Guys</p> <p>ANSWER: Dewey is wearing Louie's shirt</p>		H	D	L	H	X	✓	X	D	X	X	✓	L	✓	X	X	<p>3. Dewey is wearing Louie's shirt</p>
	H	D	L														
H	X	✓	X														
D	X	X	✓														
L	✓	X	X														
<p>4. By similar triangles, $\frac{x}{2} = \frac{5}{7}$, $7x = 10$, $x = 10/7$ cm</p> <p>$A = \frac{1}{2}bh$</p> <p>$A = \frac{1}{2}(2)(10/7)$</p> <p>$A = 10/7$ sq cm = $1 \frac{3}{7}$ sq cm</p> <p>ANSWER: $10/7$ sq cm = $1 \frac{3}{7}$ sq cm</p> 	<p>4. $10/7$ sq cm or $1 \frac{3}{7}$ sq cm</p>																
<p>5. Let l = liters the tank holds when full. $38 \text{ liters}/95\% = l/100\%$, $38/.95 = l/1$ $38 = .95l$, $40 = l$ ANSWER: 40 liters</p>	<p>5. 40 liters</p>																
<p>6. From the diagram, the cement blocks are $1 \frac{3}{4}$ ft. $6 \frac{1}{4} + \text{Block III} + \text{Block IV} + \text{Block V} =$ $6 \frac{1}{4} + 1 \frac{3}{4} + 1 \frac{3}{4} + 1 \frac{3}{4} = 9 \frac{10}{4}$ $= 11 \frac{1}{2}$ ANSWER: $11 \frac{1}{2}$ FEET</p> 	<p>6. $11 \frac{1}{2}$ feet</p>																
<p>7. Let x = speed going, let $x + 6$ = speed going home. $d = rt$ $d = rt$ $d = 15x$ $d = 13.5(x + 6)$ $15x = 13.5(x + 6)$, $15x = 13.5x + 81$ $1.5x = 81$ $x = 54$, $x + 6 = 60$ ANSWER: Speed going = 54 mph, speed coming home = 60 mph</p>	<p>7. Speed going = 54 mph, speed coming home = 60 mph (both required)</p>																



2010-2011

ANSWERS

<p>1. In one hour, $\frac{1}{5}$ of the pool is filled, ignoring the drain. In one hour, $\frac{1}{6}$ of the pool is drained, ignoring the hose. In one hour, $\frac{1}{5} - \frac{1}{6} = \frac{1}{30}$ of the pool is full, considering hose and drain. therefore: It takes 30 hours to fill the pool. ANSWER: 30 hours</p>	1. 30 hours
<p>2. The 2 end cubes will have 5 red faces. All the rest will have exactly 4 red faces. ANSWER: 7 cubes will have 4 red faces</p>	2. 7 cubes will have 4 red faces
<p>3. Use a proportion: $\frac{\%}{100} = \frac{.5}{25}$ $25 \times \% = 100 \times .5$ $25 \times \% = 50$ $\% = 50/25 = 2$ $2\% \text{ of } 25 = 1/2$ ANSWER: 2%</p>	3. 2%
<p>4. Numbers to be sums = 8, 9, 10, 12, 14, 15, 16. One solution:</p> <p style="text-align: right;">ANSWER: May vary. See sample (Accept any correct solution.)</p>	4. May vary. See sample
<p>5. The total of the 50 scores is $38 \times 50 = 1900$. After subtracting the scores of the two students, the total of the 48 scores is $1900 - 100 = 1800$. The mean of the 48 student grades is $1800 \div 48 = 37.5$. ANSWER: 37.5 (to the nearest tenth)</p>	5. 37.5
<p>6. Find the prime factorization of 70,560. $70,560 = 2^5 \times 3^2 \times 5 \times 7^2$. This means: 5 yellow cards, 2 red cards, 1 blue card, 2 purple cards ANSWER: 5 yellow, 2 red, 1 blue, 2 purple</p>	6. 5 yellow, 2 red, 1 blue, 2 purple
<p>7. 1- Area of the first = $l \times w = \\$1000$ 2- Area of the second = $(1.5 l)(1.5 w) = 2.25(l \times w)$ but $l \times w = \\$1000$ so $2.25(1000) = \\$2250$ ANSWER: \$2250</p>	7. \$2250

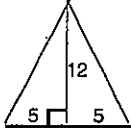


February 10, 2011

**AMERICAN SCHOLASTIC MATHEMATICS ASSOCIATION
JR/INTER SCHOOL DIVISION
SOLUTIONS, CONTEST #5 2010-2011**

Adviser: Score the contest using the answers below or equivalents. Send the scorecard within 5 days. Make up any missed contests as soon as possible. Include cumulative scores for all students.

ANSWERS

1.	<table><tr><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>51</td><td>67</td><td>84</td><td>23</td></tr></table> <p>odd multiple of 3 prime composite least number</p> <p>ANSWER: 51, 67, 84, 23 (four numbers required in order)</p>	A	B	C	D	51	67	84	23	1. 51, 67, 84, 23 (four numbers required in order)
A	B	C	D							
51	67	84	23							
2.	<p>The two palindromes on a digital clock that are separated by the shortest possible time are 9:59 and 10:01. They are separated by 2 minutes. (Two answers required.) ANSWER: 2 minutes and 9:59, 10:01</p>	2. 2 minutes and 9:59, 10:01								
3.	<p>Work backwards: From 12:01 to 2:00 = \$4.50 From 7:00 to 12:00 = \$7.50 (Since each hour she earns \$1.50, she will earn \$1.00 in 40 minutes) From 6:20 to 7:00 = \$1.00 ANSWER: She began at 6:20 PM</p>	3. 6:20 PM								
4.	<p>$16 \frac{2}{3} \% = \frac{1}{6}$ Total area = $6 \times 12 = 72$ $\frac{1}{6}$ of 72 = 12 Region II has an area of 12 ANSWER: Region II, area 12</p>	4. Region II, area 12								
5.	<p>The height of the triangle must be 12 inches. $A = \frac{1}{2}bh$, $60 = \frac{1}{2}10h$</p> <div></div> <p>$60 = 5h$ $12 = h$</p> <p>The two triangles formed by the line showing the height are right triangles.</p> <p>$a^2 + b^2 = c^2$. By substitution, $169 = c^2$; $c = 13$ ANSWER: 13 inches</p>	5. 13 inches								
6.	<p>Let y = length of log $y/2 + (2/3 \times y/2) + (1/8 \times y/2) + 5 = y$ $y/2 + y/3 + y/16 + 5 = y$ $24y + 16y + 3y + 240 = 48y$ $43y + 240 = 48y$ $240 = 5y$ $48 = y$ ANSWER: 48 inches</p>	6. 48 inches								
7.	<p>Let x = one number (left of decimal), Let y = other number (right of decimal)</p> $\frac{x+y}{2} = \frac{x+y}{100}$ $50x + 50y = 100x + y$ $50x = 49y$ <p>$x = 49y/50$. Since x must be whole, y must be a multiple of 50, and y must be a two-digit number. Therefore, $y = 50$, $x = 49$. Number is 4950 ANSWER: 4950</p>	7. 4950								



March 10, 2011

**AMERICAN SCHOLASTIC MATHEMATICS ASSOCIATION
JR/INTER SCHOOL DIVISION
SOLUTIONS, CONTEST #6 2010-2011**

Adviser: Score the contest using the answers below or equivalents. Send the scorecard within 5 days. Make up any missed contests as soon as possible. Include cumulative scores for all students.

ANSWERS

<p>1. A circle graph must equal 100%. The central angles must equal 360°. If blue cars = 15% and white cars = 15%, there is 70% left over for black, red and gray cars. Let g = gray cars; 2g = red cars, 4g = black cars. 70% = g + 2g + 4g 70% = 7g 10% = g Red cars take up 20%, which means a central angle of 72°. ANSWER: 72°</p>	<p>1. 72°</p>
<p>2. Let a = first number, b = second number, c = third number. (a - b) - c + 12 = a - (b - c) 12 = 2c 6 = c ANSWER: 6</p>	<p>2. 6</p>
<p>3. At 40 mph for 20 miles → 1/2 hour At 36 mph for 24 miles → 2/3 hour. At 48 mph for 16 miles → 1/3 hour Total miles traveled = 20 + 24 + 16 = 60 miles Total time traveled = 1 1/2 hours. d = rt 60 = r(3/2) 60 ÷ 3/2 = r 40 = r ANSWER: 40 mph</p>	<p>3. 40 mph</p>
<p>4. Let F = football, B = baseball, T = tennis ball, G = golf ball. 1) F + G = B + T 2) 3G = T + B 3) B = 8T F + G = 3G 3G = T + B F = 2G 3G = T + 8T F = 2(3T) 3G = 9T F = 6T G = 3T ANSWER: 6T = F or one football weighs as much as 6 tennis balls</p>	<p>4. 6T = F or one football weighs as much as 6 tennis balls</p>
<p>5. Work backwards. At end, Alex had 16 cents, Bill had 16 cents, Carl had 16 cents Alex had 8 cents + 8 cents from Carl = 16 cents. Carl had 24 cents - 8 cents to Alex = 16 cents. Bill had 28 cents - 12 cents to Carl = 16 cents. Alex gave 14 cents to Bill + 8 cents (see above) = 22 cents at start. ANSWER: Alex had 22 cents</p>	<p>5. Alex had 22 cents</p>
<p>6. From observation of diagram: Perimeter = 10 + 10 + 6 + 8x = 58 26 + 8x = 58 8x = 32 x = 4 cm ANSWER: 4 cm</p>	<p>6. 4 cm</p>
<p>7. Try 1/4 1/4 → (1+4)/(4+4) = 5/8 5/8 ≠ 3(1/4) Try 1/5 1/5 → (1+5)/(5+5) = 6/10 = 3/5 = 3(1/5) ANSWER: 1/5</p>	<p>7. 1/5</p>

Note: Since this is the last contest of the year, the adviser must make sure the cumulative score for each student is indicated on the scorecard so that we can issue the award for your highest scoring student.